

Classifying Organisms

Pre-Lab Discussion

Even early biologists developed classification systems in order to understand an organism and explain its relationships to other forms of life. The basis of the classification system in current use was developed in the 1700s by the Swedish botanist Carolus Linnaeus (1707–1778). Linnaeus used structural similarities as the basis of his system. Organisms were first placed in one of two large groups—the plant kingdom or the animal kingdom. Although all animals share certain similarities and all plants share certain similarities, individual members of each kingdom are quite different. Therefore, Linnaeus divided the two large groups (kingdoms) into smaller groups, and these groups, in turn, into still smaller groups.

In the Linnaean system, the largest groups are *kingdoms*, which are divided into smaller groups called *phyla* (singular, *phylum*). Phyla are then divided into *classes*, and classes are divided into many *orders*. Orders, in turn, are divided into *families*, families into *genera* (singular, *genus*), and genera into one or more *species*. Though most biologists generally classify organisms within these categories, they do not always agree on the criteria for placing an organism in a particular category. Because an organism can be observed from many viewpoints, the same organism may be classified differently by different biologists.

In this investigation, you will group and regroup a number of pictured objects according to similar characteristics. You will also classify a variety of monkeys and apes (primates) on the basis of their similarities and differences.

Problem

How can organisms be classified?

Materials (per student)

Scissors

Safety

Be careful when handling sharp instruments. Note all safety alert symbols next to the steps in the Procedure and review the meanings of each symbol by referring to the symbol guide on page 10.

Procedure

Part A. Grouping Objects

1. Use scissors to cut along the dotted lines around each pictured object in Figure 4 on page 201.
CAUTION: Be especially careful if you are working with sharp pointed scissors.
2. Place the group of objects you cut out in front of you. Then choose some characteristic to separate the objects into two groups of approximately equal numbers.
3. In Observations, make a branching chart similar to the one in Figure 1 to show how you divided the objects. Write the criterion you used to divide the group on the lines in your chart corresponding to line A1 and A2. Also list the numbers of the objects that belong on lines A1 and A2.

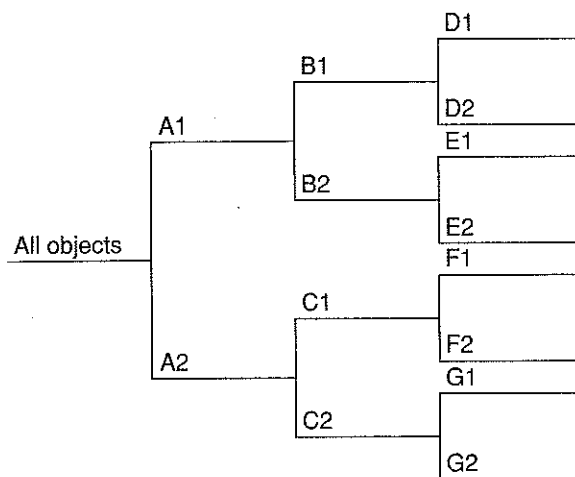


Figure 1

4. Next choose some characteristics to divide the objects in group A1 into two subgroups. Write their characteristics and numbers on your chart on the lines that correspond to lines B1 and B2 in Figure 1. Separate group A2 into two subgroups, and write their characteristics and numbers on the lines that correspond to lines C1 and C2.
5. Continue dividing each group until each pictured object is separated from all of the others. On your chart, continue to list the criterion you used for dividing each group. **Note:** Your chart may not contain all of the branches shown in Figure 1. Also, you may need to extend your chart by adding branches not shown in Figure 1.

Part B. Grouping Living Organisms

1. When classifying organisms, biologists must be very observant. Often only slight differences separate the members in one classification group from those in another. Study Figure 2, which shows some traits used for identifying primates.

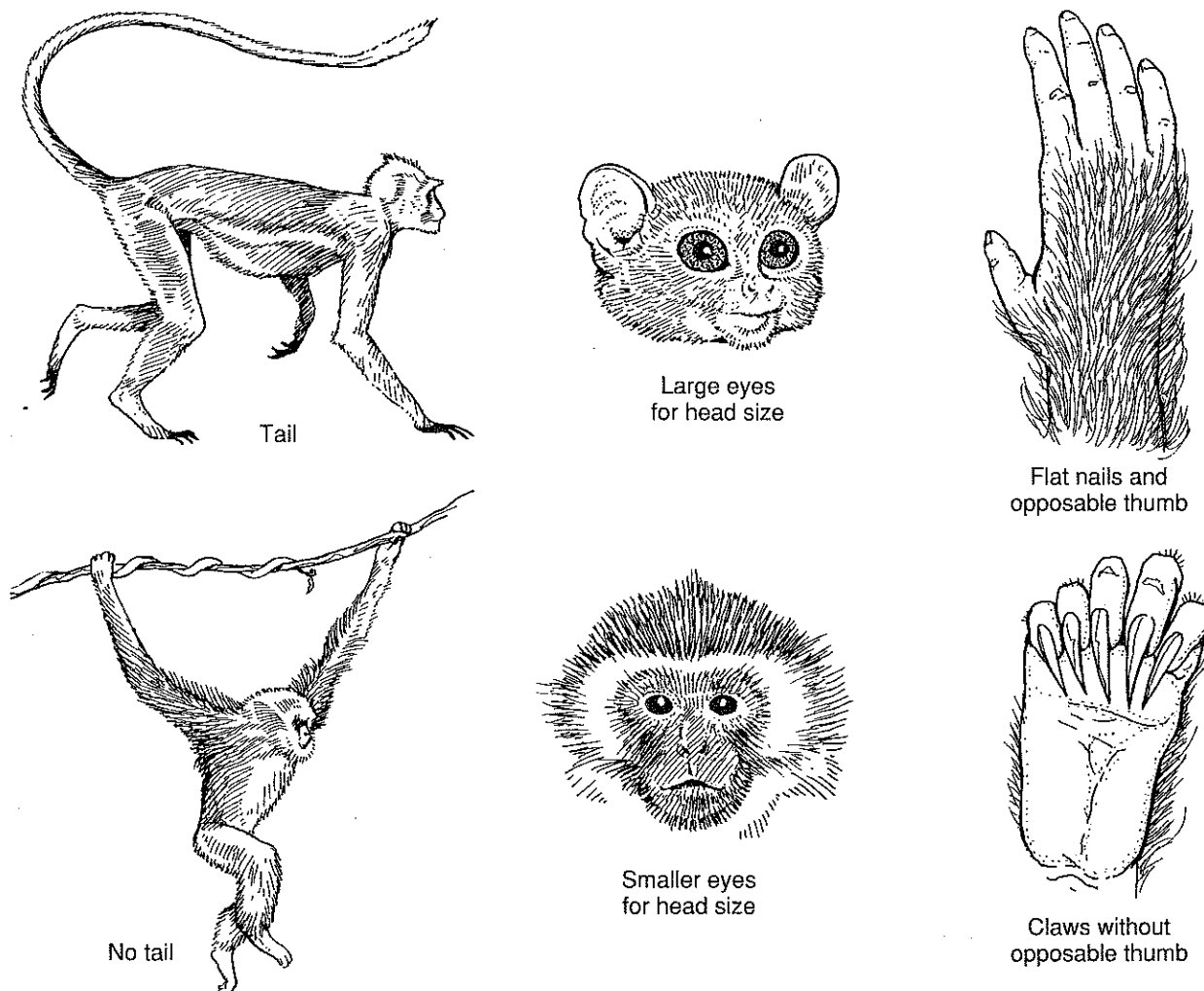


Figure 2

2. Use the traits shown in Figure 2 and other traits to separate the primates in Figure 3 into two groups of approximately equal numbers. Use the space in Observations to make a branching chart similar to the one in Figure 1 to show how you separated the primates. Write the characteristics that you used to make your first division on the lines that correspond to lines A1 and A2 in Figure 1.

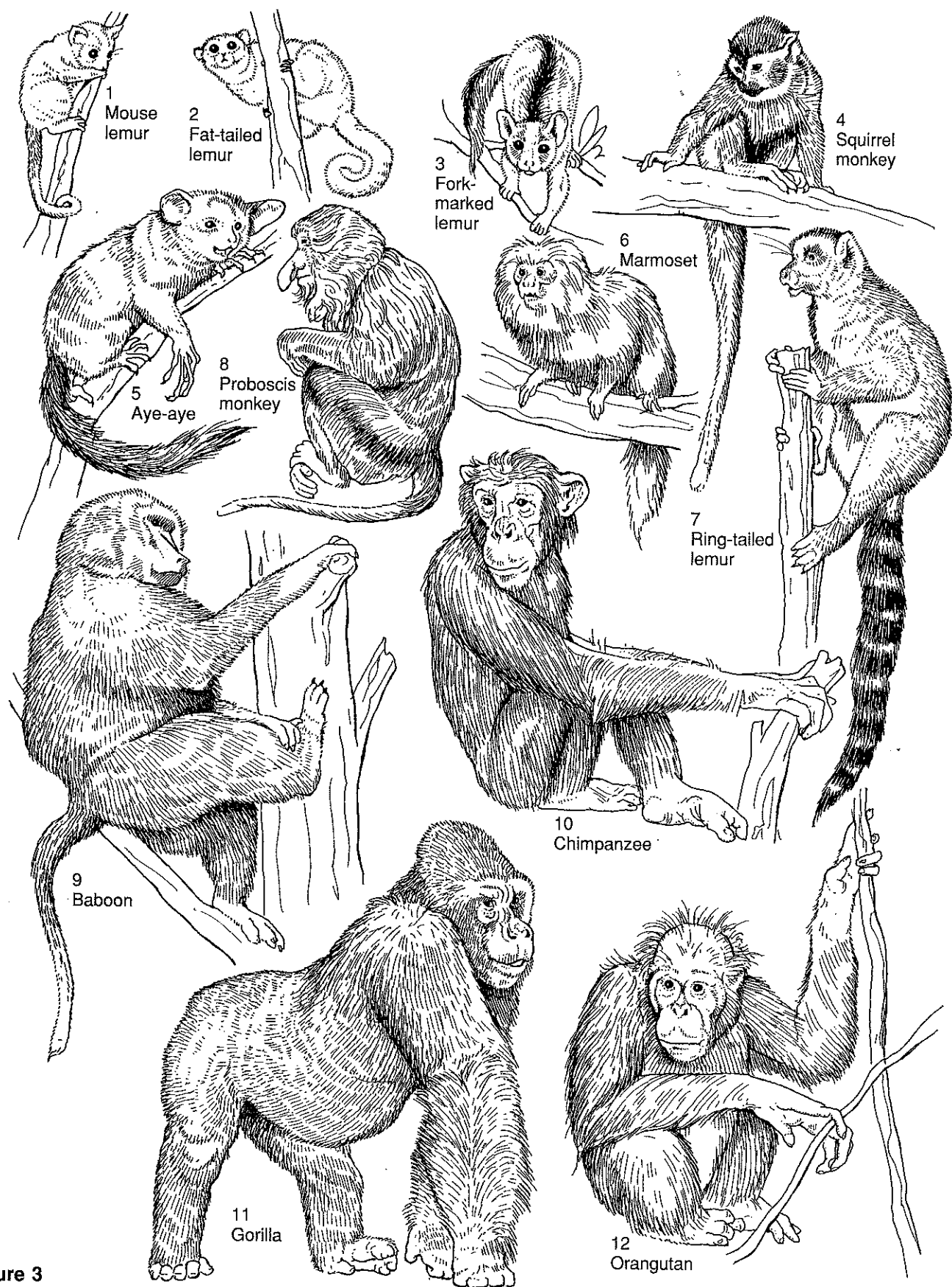
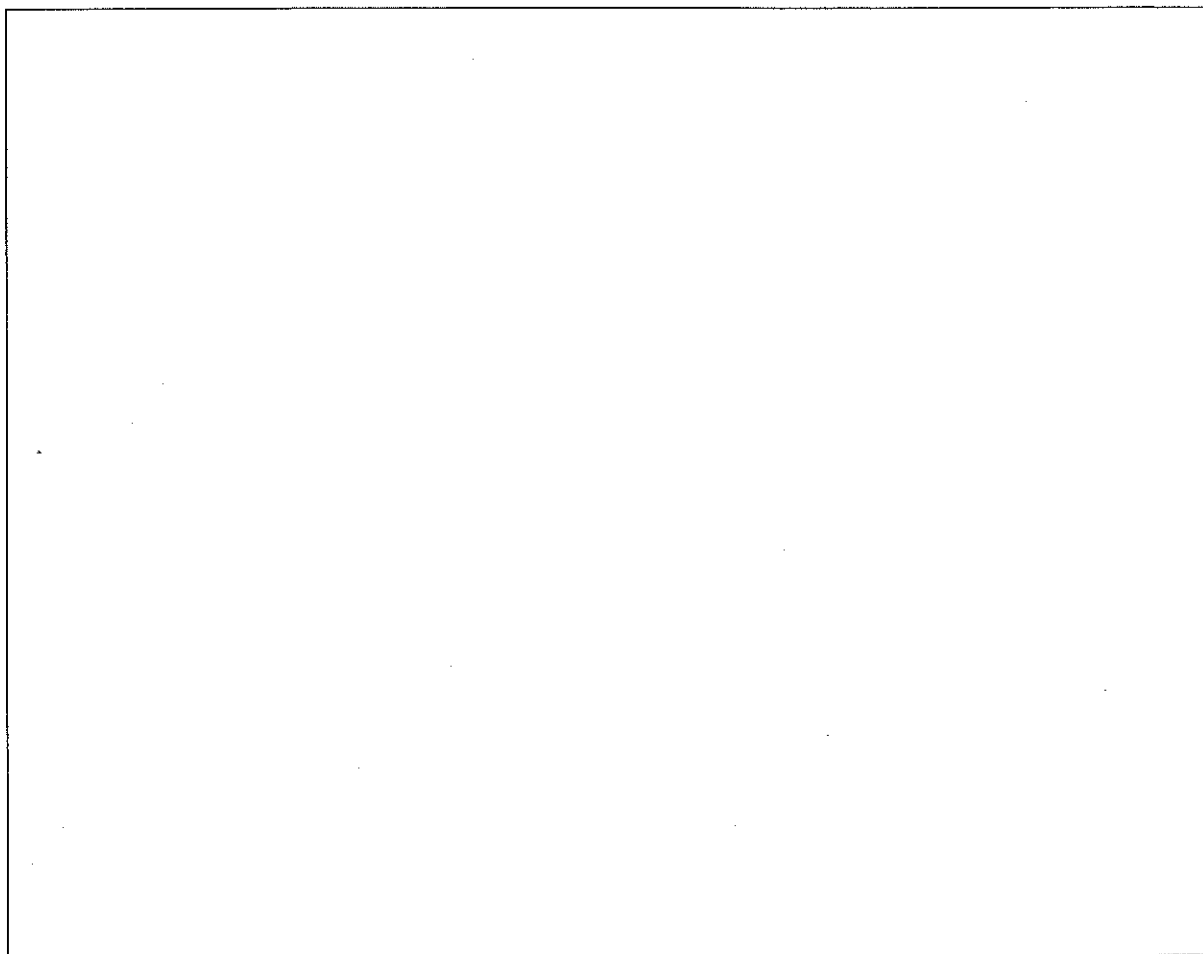


Figure 3

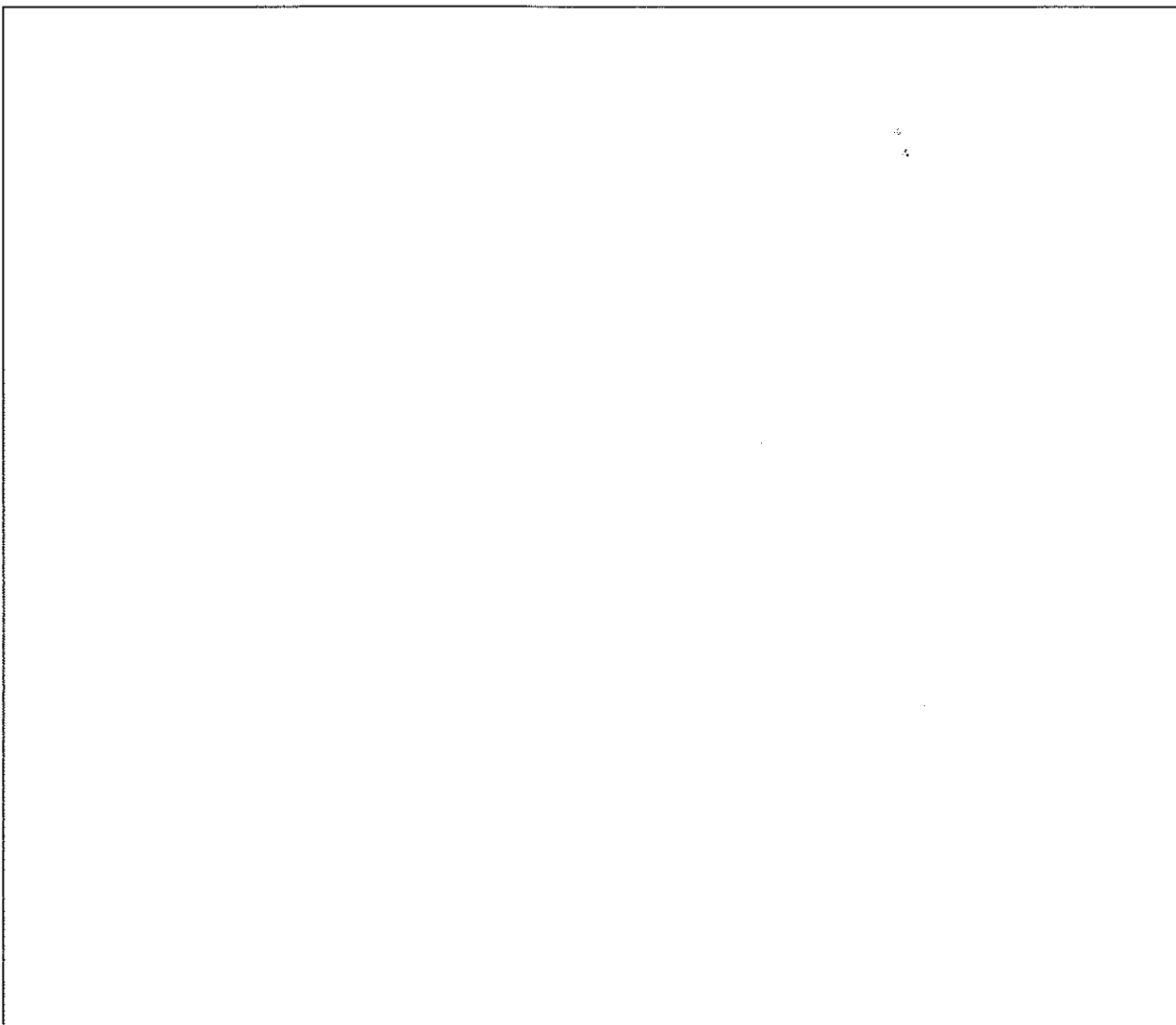
3. Continue to divide the primates into smaller groups until each is separated from all of the others. As you divide the primates into subgroups, complete your chart by listing the characteristics you used to separate them.

Observations

Branching Chart for Classifying Objects in Figure 4



Primate Branching Chart



Analysis and Conclusions

1. How is this investigation similar to the way in which biologists classify organisms?

2. Were either of your classification systems different from those developed by classmates? Why might this be possible? _____

3. What characteristics did you find most useful for classifying the primates?

4. What characteristics of the primates would not be especially useful for classifying them?

5. Why should terms like *tall*, *short*, *large*, or *small* be avoided when describing traits of organisms? _____

6. How does classification help you to better understand organisms? _____

Critical Thinking and Application

1. Trees are usually identified by the characteristics of their leaves. Suggest two ways in which trees could be identified during winter when they have no leaves. _____

2. Suppose you wanted to identify and classify all birds that came to a particular bird feeder during a spring day. What are some common characteristics you would use in classifying the birds? _____

3. Almost immediately after the invention of the microscope, taxonomists began to use it in their work. Why might a microscope be useful to a taxonomist? _____

4. Describe three ways in which pieces of clothing are classified in a department store.

Going Further

1. Devise a system to classify the different kinds of shoes your classmates wear. Make a chart similar to Figure 1 to show the different categories and characteristics used to group the shoes.
2. Make a list of ten or more household appliances. Exchange your list with a classmate. Classify the appliances into groups based on similar characteristics. Make a chart similar to Figure 1 to show the different categories and characteristics used to group the appliances.

Use Figure 4 to complete step 1 of Part A.

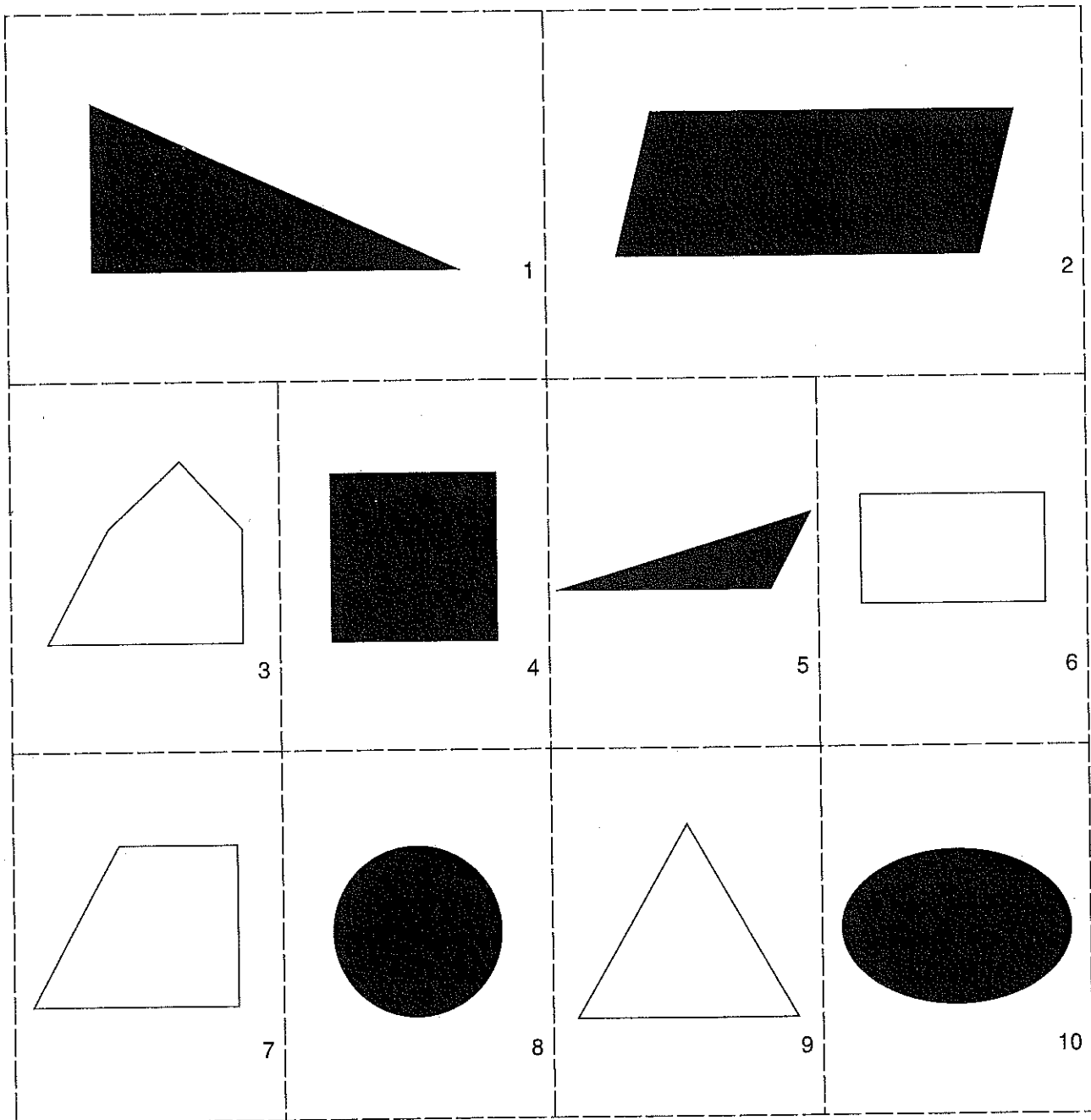


Figure 4